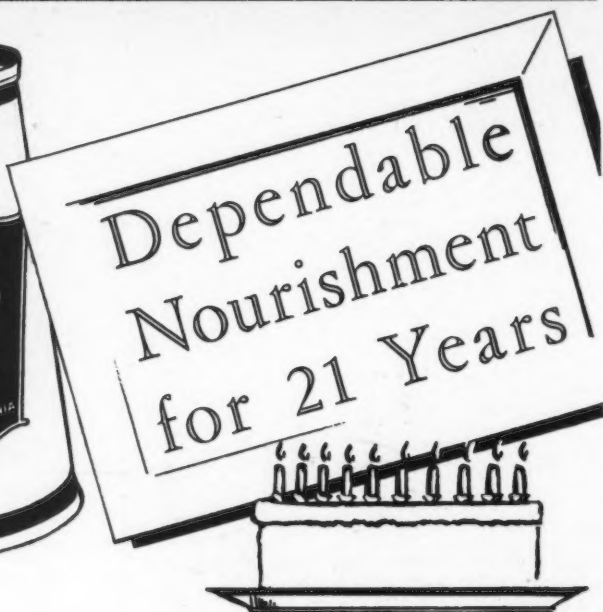


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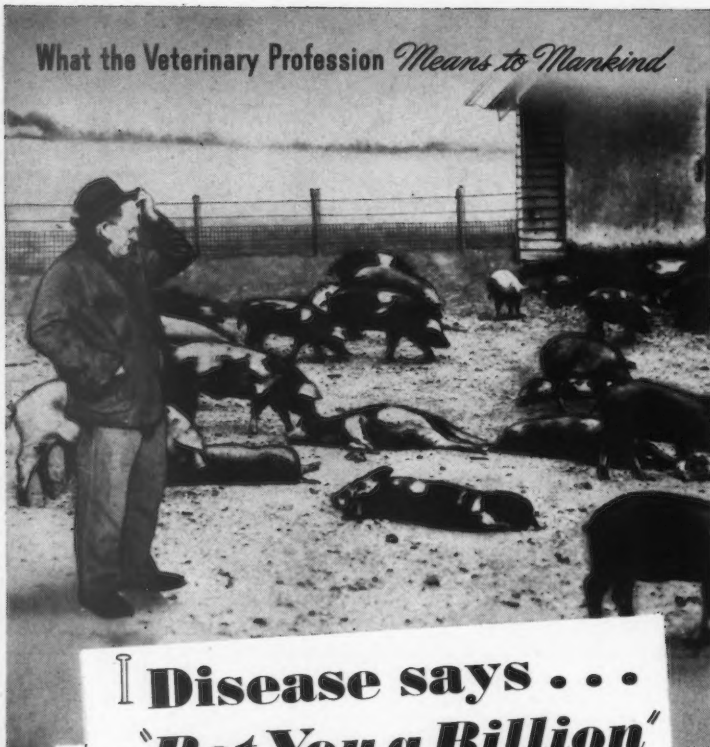


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*Bergey Manual Determinative Bacteriology, Sixth Edition—1948.

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I. Foley, E. J.; Stults, A. W.; Lee, S. W., and Byrne, J. V.: Am. J. Vet. Research 10: 66 (Jan.) 1949.

THE CALIFORNIA VETERINARIAN

SEPTEMBER-OCTOBER, 1949

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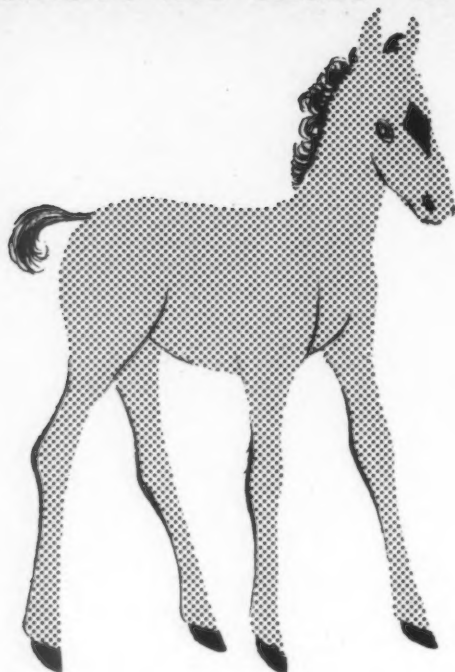
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Fourteenth International Veterinary Congress London, August 7-13, 1949

The Congress was attended by over 1,000 delegates from 53 countries. At the opening session the large gathering was welcomed on behalf of the British Government by Mr. Hector McNeill, Minister of State, who said "Hunger is an international currency, knowledge should be an international passport."

The theme of the Congress was the conservation of our food animals. It is being recognized that political stability in the world cannot be insured unless the food supplies of peoples are assured.

The five morning plenary sessions from Monday to Friday were started on Monday by Lord Boyd Orr of Scotland, former Director of the Rowett Research Institute and first chairman of the Food and Agriculture Organization (F. A. O.) who presented the World Food Situation. This was followed on succeeding days with addresses by distinguished veterinarians on the veterinary profession's contributions to World Milk Supply by H. C. Bendixen of Denmark on Tuesday, World Meat Supply by C. S. M. Hopkirk of New Zealand on Wednesday, World's Poultry and Egg Supplies by J. R. Beach of the United States on Thursday, and Breeding and Rearing of Animals by N. Lagerlof of Sweden on Friday.

The sectional meetings were conducted each afternoon in five different meeting places at the same time and a large number of papers were presented in the three different official languages authorized at these Congresses. All of this material will be published in the Proceedings of the Congress.

Honorary presidents of the Congress from several countries were named in absentia by the central committee, John R. Mohler being honorary president for the United States. Sir Daniel Cabot, formerly chief veterinary officer of the British Ministry of Agriculture, was elected president of the Congress at the first meeting.

Fifteen resolutions were passed at the closing meeting on Saturday morning. One of those provides for each country to have a permanent international congress organization committee, the chairman of which would be the member representing that country on the Permanent International Committee. In this country Dean Wm. Hagan of the Cornell Veterinary School succeeds John R. Mohler, who resigned from the Permanent Committee. Another resolution provided for the next meeting of the Congress to be held in Stockholm, Sweden, in 1953. A third provided for contributions to a Congress Fund from each country in proportion to membership in the respective national associations amounting to one shilling per member.



DR. GEORGE H. HART

Dean of the University of California's College of Veterinary Medicine at Davis, California, has recently returned from England where he attended the Fourteenth International Veterinary Congress held in London, August 7 to August 13, 1949. Dr. Hart has been good enough to send us this article regarding the Congress.

W. A. Hagan, R. A. Kelser and S. B. Simms of the United States, along with representatives of other countries, were honored by being made Honorary Associates of the Royal College of Veterinary Surgeons.

The absence of the usual large German delegation was made up by larger groups from Africa, South America and Islands of the Atlantic and Pacific areas.

The entertainment, during the sessions, was of the usual high order that London knows so well how to do, and has such good facilities to carry out. The reception at the badly bombed Guild Hall by the Royal College of Veterinary Surgeons, the banquet by His Majesty's Government to the Government Delegates, the Congress Banquet at the Savoy, reception to overseas visitors from the British Commonwealth by the Overseas League at Overseas House, and the dance at Dorchester Hotel by the president of the National Veterinary Medical Association made every evening of the week most enjoyable, and the real elaborate hospitality was greatly appreciated by all.

The post-congress tours to Weybridge, Cambridge, the Animal Health Trust Research Stations, Boots Pure Drug Co., Ltd., Nottingham, and Burroughs Wellcome gave remarkable opportunity for the delegates to get better acquainted, and see at first hand the large amount of research work in veterinary science that is going on in England.

Despite all the difficulties facing those directly responsible for carrying out the actual staging of this large undertaking, it was very well managed in every detail. The Congress will go down in history as a milestone in the broader development of the responsibilities of the veterinary profession to livestock well-being and human health throughout the world.



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Livestock Diseases Reported

DR. A. K. CARR, *Administrator*

Division of Animal Industry, State Department of Agriculture, Sacramento, California

Tabulation of diseases reported to the State Division of Animal Industry during the period May to August inclusive, also a summary of the reports for the previous eight months.

	May-Aug., incl., 1949			Previous 8 Months Sept. 1948- Apr. 1949, incl.		
	North	Central	South	North	Central	South
Actinomyces					1	
Anaplasmosis	11	4	4	8	6	5
Anthrax, Cattle	1	3	1	2	17	
Hogs	1			1		1
Sheep			1			1
Bovine Bac. Hemoglobinuria	5			2		
Caseous lymphadenitis				2		
Coccidioid granuloma, Cattle		8			9	
Coccidiosis, Cattle		1		1	1	
Sheep	1	2		7	3	
Cysticercus, bovis		1	3		2	1
Equine encephalomyelitis	87	47	53	11	8	16
Foot rot, Cattle		1		4	3	
Sheep		1		3		
Hog cholera	16	7	2	25	19	5
Infectious keratitis, Cattle				2		
Sheep				1		
Infectious pneumonia, Calves		1		3		
Johne's disease, Sheep	1			1		
Listerellosis, Sheep			1			
Malignant edema, Cattle		1	1	2		
Sheep				1		
Mycotic stomatitis, Cattle		1		1		
Paratyphoid Infection, Sheep				2		
Hogs	2			1	1	
Choriopic Scab, Cattle				1		1
Sarcoptic Scab, Cattle					2	
Swine erysipelas					3	
Texas fever ticks			2			1
Vesicular exanthema, Swine	5	13	5	2	25	26

Secretary Travers' office, 3004 16th Street, Room 208, San Francisco 3, is in need of case reports for this magazine. Short concise histories will be much appreciated; they are not hard to write and always interesting to read.

If you have something to report, please report it.

Research Fellowship Awards

- I. Objective: To assist in the training of additional personnel for furthering the interests of agriculture, particularly the livestock and poultry industries.
- II. Awards will be made in the fields of (1) nutrition and physiology research as applied to dairy, poultry and animal husbandry; and (2) research in transmissible diseases of livestock and poultry.
- III. Any individual qualified for graduate study in any Land-Grant Agricultural College or approved Veterinary College (including Canadian Colleges) who possesses desirable personal qualifications and submits a completed application may be eligible. The application and necessary requested information must be in the hands of the Awards Committee by March of the year the Award is to be made.
- IV. Research Fellowships will be awarded on an annual basis. The recipient of an award may be eligible for appointment not to exceed a tenure of three years.
- V. Not more than seven Research Fellowships shall be awarded annually, as follows: Not more than two each in dairy husbandry, animal husbandry, and poultry husbandry; and not more than one in the field of veterinary science.
- VI. The selection of the recipients of the Annual Research Fellowship Awards, as well as the rules governing the awards, shall be made by a committee of an officially appointed representative of each of the following organizations: Poultry Science Association, American Veterinary Medical Association, American Dairy Science Association, American Society of Animal Production, Association of Land-Grant Colleges and the Ralston Purina Company.
- VII. Amount of Fellowship—\$1,440 annually.
- VIII. Application blanks for these Fellowship Awards may be obtained by writing the Ralston Purina Research Awards Committee, c/o Mr. J. D. Sykes, Ralston Purina Company, St. Louis 2, Missouri.

The Monterey Bay Area Veterinary Medical Association is getting out a monthly news letter which gives a report of their meetings for the benefit of those who could not attend or for permanent record books of interested members. Announcements are made, and future events given notice.

Dr. L. M. Hurt of Los Angeles was appointed to the "Inactive Membership Committee" of the American Veterinary Medical Association at their Executive Board Meeting held in Detroit last July.

New California Licensees in Veterinary Medicine

Anderson, L. M., Colfax, Wash.; Bates, Robert Moaney, Stanwood, Wash.; Beller, George Iven, Lynwood, Calif.; Bogart, Elmer Preson, Pullman, Wash.; Bowstead, Leonard Allen, Winnemucca, Nev.; Bristol, David Lowell, Salinas, Calif.; Budurtn, Alexander A., Tucson, Ariz.; Bustad, Leo Kenneth, Tacoma, Wash.

Case, Harland, Robert, Palm City, Calif.; Chudacoff, John David, Los Angeles, Calif.; Clark, Robert Edwin, Bakersfield, Calif.; Cunningham, Norman Eugene, Bakersfield, Calif.; Diamond, Edward, Seattle, Wash.; Drummond, Wm. Andrew, Vancouver, Wash.; Eastep, Woodrow W., Palo Alto, Calif.

Goetz, Martin Elzinga, Los Angeles, Calif.; Groves, Lawrence Wesley, Pullman, Wash.; Hafen, Earl Guy, Pullman, Wash.; Hagan, Thomas Frank, Visalia, Calif.; Hargas, John, Phillips, Wis.; Hill, Victor V., Lakeview, Ore.; Hughes, John Patterson, Madera, Calif.; Humphrey, Geo. Louis, Petaluma, Calif.

Kay, Edwin Wm., Jr., San Jose, Calif.; Keaton, Wm. Henry, Hollister, Calif.; Kennedy, Peter Carleton, Boston, Mass.; Kirk, Samuel Keith, Modesto, Calif.; Kitzman, Louis Mervin, North Hollywood, Calif.; Larsen, Louis, San Mateo, Calif.; Lawson, Robert Charles, Mountain View, Calif.; Layton, Robert Stanley, North Hollywood, Calif.; Lewis, John Sanford, Santa Monica, Calif.; Lundberg, Arthur W., Jr., Visalia, Calif.; Lustig, Peter, Ames, Iowa.

Mariono, Dario H., Sonoma, Calif.; Metz, Eugene Thaddeus, Fort Collins, Colo.; Peterson, Roy Hubert, Tillamook, Ore.; Pollack, Murray Alfred, Cleveland, Ohio; Reddick, Harry E., Jr., Santa Paula, Calif.; Rider, Helen Elizabeth, Tigard, Ore.; Righetti, Alton Timothy, San Luis Obispo, Calif.; Rossol, Herman Rensselaar, San Diego, Calif.; Rothenbergh, Norman A., Adelanto, Calif.; Schock, Robert Clarence, Chula Vista, Calif.; Smith, Dean Harley, Pullman, Wash.

Thackeray, Chester Norman, Vancouver, Wash.; Thomasson, George Robert, Knox City, Texas; Underwood, Robert Edward, San Francisco, Calif.; Wasson, Donald Quimby, Hilton, Calif.; Watkins, Ray Bruce, Salem, Ore.; Watts, Frank Milnes, Kelso, Wash.; Wayland, Frank Warren, San Jose, Calif.; Weiner, Charles, Grass Valley, Calif.; Wels, Joachim, Palo Alto, Calif.; Wheeler, Richard Albert, North Hollywood, Calif.; Wight, James Beattie, Los Angeles, Calif.; Williams, Ernest, San Francisco, Calif.; Wixom, David Holland, Cambria, Calif.; Woolsey, John Homer, Woodland, Calif.; Wong, Donald Herbert, Honolulu, T. H.; Young, Elmer William, Walla Walla, Wash.

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New Applicants

J. M. Christensen, Petaluma—vouchers: Harvey Campbell and F. E. Clarke.

James Rice, Redding—Vouchers: C. J. Ferreira and R. K. Balch.

Canine Filariasis in California

By I. M. ROBERTS,* D.V.M., Oakland, California

Canine Filariasis, or heartworm disease, is well known in the southern and eastern parts of the United States. Price and Harwood¹ mention its prevalence in those areas and state further that the disease has become definitely established in some northern localities. Except for a description of three cases by Roberts and Roberts² and information received by Swartz,³ there has been no report of this disease in native California dogs.

Sixty cases of canine filariasis will be described in this paper, thirty-eight of which were proven never to have been out of the state of California. All of these cases were found in dogs presented for treatment in an average small animal practice. Examination for microfilaria was not made routinely, but only where clinical symptoms or history indicated that heartworms might be present.

At first, direct examination of the peripheral blood and direct examination of the blood serum were used for diagnosis. However, the concentration method, as described by Stubbs and Live⁴, was found more efficient, for in a lightly infested animal only this technique is accurate enough to find the microfilaria consistently.

Concentration Technique

1. Draw 5 to 10 cc. of blood by venepuncture.
2. Place in a test tube and allow to coagulate, preferably on the slant.
3. Decant serum into a centrifuge tube.
4. Fill the remainder of the tube with distilled water and mix by inverting two or three times.
5. Centrifuge at 600 to 1000 r.p.m. for 6 minutes or allow the tube to stand overnight.
6. Pour off supernatant fluid from tube until a drop or two remains.
7. Shake tube to resuspend the sediment, which will contain the microfilaria.
8. Pour this material on a slide and examine with low power objective, with subdued illumination, for the microfilaria are nearly transparent. When isolated by this method, in a sample a few hours old, the parasites will have slight motility.

*Dr. I. M. Roberts gratefully acknowledges the assistance of Dr. Dean P. Furman of the University of California who made the measurements of the microfilaria and the assistance of Mr. Theodore Aarons of the Alameda County Mosquito Abatement District, Dr. Russell P. Swartz of Vallejo, and Dr. James Douglas, University of California.

¹Harwood, E. W., and Price, P. D.: "Internal Parasites of Dogs and Cats." *Yearbook of Agriculture*, 1942; 1161-1163.

²Roberts, I. M., and Roberts, S. R.: "Canine Filariasis—A Report"; 1946. *J.A.V.M.A.*, 109; 490.

³Swartz, R. P.: "Personal Communication."

⁴Stubbs, E. L., and Live, I.: "The Diagnosis of Filariasis in the Dog"; 1938. *J.A.V.M.A.*, 92; 686-690.

A description of the sixty infected dogs and a brief outline of the symptoms observed will be found in the table below.

Native California Dogs

Description of Animal	Symptoms
1. 4 yr. male Llewellyn setter	Cough. Occasional vomiting. Urinalysis showed picture of chronic nephritis.
2. 10 mo. male mongrel	Vomiting. Diarrhea.
3. 18 mo. male cocker spaniel	Cough. Mucopurulent conjunctivitis. Diarrhea.
4. 8 mo. male cocker spaniel	No acute symptoms.
5. 9 mo. female collie	Persistent diarrhea.
6. 3 yr. male Doberman Pinscher	No acute symptoms.
7. 3 yr. male cocker spaniel	Acute bronchitis with purulent eye and nose discharge, and elevation of temperature.
8. 15 mo. cocker spaniel	Occasional running and barking fits. Intermittent diarrhea.
9. 2 yr. male mongrel	Chronic eczema on back near base of tail.
10. 8 yr. female pointer	Generalized eczema.
11. 8 mo. female mongrel	Occasional running and barking fits.
12. 4 yr. male cocker spaniel	Eczema ears and head.
13. 1 yr. male German shepherd	Generalized eczema.
14. 1 yr. male German shorthair pointer	Acute bronchitis with mucopurulent eye and nose discharge.
15. 1 yr. male mongrel	No acute symptoms.
16. 3 yr. male cocker spaniel	Periodic attacks of emesis.
17. 3 yr. male cocker spaniel	Occasional convulsions.
18. 1 yr. male cocker spaniel	No acute symptoms.
19. 1 yr. female mongrel	Acute depression. Emesis.
20. 3 yr. male mongrel	Chronic eczema on back near base of tail and backs of hind legs.
21. 2 yr. male mongrel	Chronic eczema on back near base of tail and backs of hind legs.
22. 2 yr. female mongrel	Acute depression two weeks after whelping. No features of eclampsia.
23. 5 yr. male mongrel	Chronic eczema on back near base of tail.
24. 4 yr. female Irish water spaniel	Tired easily in the hunting field.
25. 2 yr. male cocker spaniel	No acute symptoms.
26. 1 yr. female Irish setter	No acute symptoms.
27. 4 yr. male cocker spaniel	Periodic attacks of depression of 3 to 4 days' duration.
28. 2 yr. male dachshund	Acute bronchitis. Temperature 105 degrees at height of attack.
29. 5 yr. male mongrel	Periodic convulsions.
30. 2 yr. female mongrel	Generalized acute eczema.
31. 2 yr. male cocker spaniel	Acute bronchitis.
32. 1 yr. male mongrel	No acute symptoms.
33. 3 yr. male mongrel	No acute symptoms.
34. 1 yr. female cocker spaniel	Persistent diarrhea.
35. 15 mo. female German shepherd	Persistent abnormal shedding of hair.
36. 18 mo. male cocker spaniel	Eczema on head and ears.
37. 12 yr. male mongrel	Generalized chronic eczema.
38. 8 yr. male cocker spaniel	Generalized eczema. Urinalysis showed findings in chronic nephritis.

Out-of-State Dogs*

Description of Animal	Symptoms
1. 4 yr. cocker spaniel	Persistent diarrhea.
2. 5 yr. male pointer	Symptoms of pneumonia.
3. 4 yr. male mongrel	Symptoms of chronic bronchitis.
4. 8 mo. male cocker spaniel	Bilateral staphylococci.
5. 1 yr. female cocker spaniel	No acute symptoms.
6. 8 yr. male mongrel	Intermittent diarrhea.
7. 2 yr. female German shepherd	No acute symptoms.
8. 1 yr. female cocker spaniel	Generalized eczema.
9. 15 mo. male mongrel	Generalized eczema. Persistent diarrhea.
10. 15 mo. male mongrel	No acute symptoms.
11. 4 yr. female boxer	No acute symptoms.
12. 2 yr. male spitz	Lymphadenopathy.
13. 10 yr. male mongrel	Cough. Bloody diarrhea. Emesis.
14. 1 yr. female Irish setter	Persistent cough.
15. 4 yr. male boxer	No acute symptoms. Urinalysis showed picture in chronic nephritis.
16. 12 yr. male spitz	Chronic cough.
17. 10 mo. male German shepherd	Symptoms of pneumonia.
18. 4 yr. male mongrel	Persistent abnormal shedding of hair.
19. 2 yr. male mongrel	Persistent abnormal shedding of hair.
20. 4 yr. male mongrel	No acute symptoms.
21. 5 yr. male cocker spaniel	No acute symptoms.
22. 6 yr. male cocker spaniel	Intermittent diarrhea.

*Included in this group are dogs of unknown origin, i.e. strays, pound dogs, etc.

A tabulation of the above 60 cases according to outstanding symptoms shows:

Symptoms	No. of Cases	Percentage
Cough, bronchitis, etc.	12	20
Diarrhea, emesis	9	15
Eczema	12	20
Convulsions	4	6
Miscellaneous	8	14
None	15	25

Skin and respiratory symptoms were most commonly observed. Involvement of the gastro-intestinal tract was next in importance. Central nervous symptoms were seen in a few cases.

Most of the infected animals described above were underweight and exhibited harsh, dry coats. According to histories obtained from the owners, most infected dogs exhibited irregular appetites, were more or less listless and slept a great deal. Loss of weight and a harsh, dry coat will often be present in a chronic disease, and canine filariasis is chronic in nature.

Price and Harwood¹, in describing the symptoms of canine filariasis, state: "The symptoms of heartworm disease in dogs may vary considerably, and in some instances no indication of infection may be detected until the blood has been examined. Usually, however, the first symptoms appear following vigorous exercise. The infected animal may tire easily, lie down, gasp for breath, and collapse. After a short rest the dog may recover and for a time appear normal. Coughing is also a common symptom. In cases of long standing, ascites, or abdominal dropsy, may develop, and, because of poor circulation, the legs and other parts of the body may swell. Nervous symptoms, such as fixity of vision, fear of light, and convulsions, have also been noted in infected animals."

One important aspect of the symptomatology of this disease must be emphasized; symptoms are not present at all times even in heavily infected individuals. Some affected dogs will go through periods when health and general condition are good or excellent. Attacks of varied symptomatology and greater or lesser severity will nevertheless occur in these animals. It has been possible to examine two untreated males at fairly frequent intervals. For short periods, both of these dogs appear almost normal. They gain weight, then lose it again. Both have attacks of respiratory difficulty at irregular intervals, impossible to distinguish from an infectious bronchitis. Except for these symptoms these dogs appear quite normal, even though one of them when first examined was suffering from a severe bronchitis with copious purulent nasal discharge and was thin almost to the point of emaciation. Microfilaria are still present in the blood of both these dogs.

Microfilaria were not found in the blood of any dogs under eight months of age. Brown²

reports evidence that the worms reach maturity in less than eight months. Burns³ has found microfilaria in dogs five months of age, where the possibility of prenatal infection was eliminated.

Of the total of 60 cases, 29 were treated. Fouadin, according to the method recommended by Wright and Underwood⁴ was employed in the majority of these cases, and Caricide (Lederle) for the others. On the basis of repeated negative blood examination and improved physical condition, it is considered that 13 animals recovered completely, while 15 showed clinical improvement. One died of liver disease a week after treatment was begun.

It was possible to examine at autopsy five untreated out-of-state dogs, two untreated native California dogs, and two treated California dogs a month after treatment. The findings are outlined in the table below.

Out-of-State Dogs

Description of Animal	Autopsy Findings
1. 5 yr. male pointer	7 adult <i>Dirofilaria immitis</i> in heart. Prostate greatly enlarged and calcareous lesions in lungs. 30 adult <i>Dirofilaria</i> in heart.
2. 4 yr. male mongrel	No adult <i>Dirofilaria</i> found. Grossly normal.
3. 1 yr. female cocker spaniel	No adult <i>Dirofilaria</i> found. Grossly normal.
4. 10 yr. male mongrel	15 adult <i>Dirofilaria immitis</i> in heart.
5. 8 yr. male cocker spaniel	

Native California Dogs

Description of Animal	Autopsy Findings
1. 2 yr. female mongrel.	No adult <i>Dirofilaria</i> found. Grossly normal.
2. 3-yr. male cocker spaniel (Died during treatment)	No adult <i>Dirofilaria</i> found. Two indurated areas in liver about one inch in diameter. Bronchopneumonia.
3. 1 yr. male cocker spaniel	No adult <i>Dirofilaria</i> found. Bronchopneumonia.
4. 2 yr. male cocker spaniel (Killed in auto accident one month after treatment)	No adult <i>Dirofilaria</i> found. Grossly normal.

Price and Harwood¹ point out that in many cases it is not possible to locate the adult worms in the heart. This indicates that the worms responsible for the larvae are in an unusual location in the body, or have become absorbed. Larvae may persist in the body for some time after the parent worms have died, Underwood and Harwood⁴ have shown. In an asymptomatic individual with few microfilaria in the blood the possibility that a spontaneous recovery has occurred must be carefully considered.

In all cases an effort was made to determine whether any other infection or condition might be responsible for the symptoms observed. A urinalysis was routinely performed. This consisted of specific gravity, ph, notation of color

²Brown, H. W.: "Observations on the Dog Heartworm, *Dirofilaria immitis*." *North Amer. Vet.*, 21: 230-231.

³Burns, H. C.: "Personal Communication."

⁴Wright, W. W., and Underwood, P. C.: "Fouadin in the Treatment of Infestations with the Dog Heart Worm, *Dirofilaria immitis*"; 1934. *Vet. Med.*, 29: 234-236.

⁵Underwood, P. C., and Harwood, P. D.: "Survival and Location of the Microfilaria *Dirofilaria immitis* in the Dog"; 1939. *Jour. Parasitol.*, 25: 23-33.

and degree of cloudiness, albumen, sugar, bile, and microscopic examination of centrifuged sediment. Stools were examined directly under high dry power for pathogenic bacteria and protozoa, and by glucose flotation. Where indicated, a complete blood count was done, and fluoroscopic or X-ray examination made. Blood test for microfilaria was taken in many instances because a careful physical and laboratory examination did not disclose the cause of illness. Studies were made of microfilaria found in California dogs, using Giemsa's stain. According to measurements and morphological characteristics, these microfilaria were considered to be identical with those of *Dirofilaria immitis*.

A number of individuals, as noted above, received treatment for filariasis. The results, without exception, were good, ranging from definite improvement to complete disappearance of symptoms. Treatment in every instance resulted in gain of weight, improvement in appetite, coat, and general health.

Adult *Dirofilaria immitis* were not found in any of the native California dogs on autopsy. It is not at all rare, however, to find no adults in dogs harboring a large number of microfilaria. The 10-year-old male mongrel examined at autopsy in the out-of-state group was an example. With the relatively low numbers of microfilaria found in native California dogs, the adults would be few in number also. Further evidence may be necessary to explain the absence of adults more satisfactorily.

Most of the native dogs were from the San Francisco Bay area. One was born near Stockton, and another had spent two years in Riverside. As nearly as could be determined, the rest had never left the Bay area.

A total of approximately five hundred blood tests for microfilaria were made, resulting in finding the 60 positive cases. This cannot, however, be considered more than a rough indication of the incidence of infection, for blood tests were not taken routinely.

On preliminary observation, the number of microfilaria were in direct proportion to the chronicity of clinical symptoms. In any one attack, however, the number of microfilaria had no relation to the severity of the attack.

There is one important difference between those dogs known to have lived and been infected in the south, and infected native California dogs. Numerous microfilaria were present in the blood of the southern cases, readily found by direct microscopic examination of a drop of whole blood. However, it was difficult, and in many instances impossible, to discover microfilaria in the infected California dog unless the serum was examined directly, or centrifuged according to the method described above. In the native individuals, after centrifuging the serum from five cc. of blood, the

number of microfilaria seen in one drop of sediment varied from approximately three to two hundred. The smaller number of microfilaria in the blood of California dogs, coupled with the fact that relatively few lesions were seen on autopsy, would indicate that the severity of infection is not as great in the San Francisco Bay Region as in southern states. There is probably a lower number of infected mosquitoes to which the dogs are exposed in the former area.

Mosquitoes belonging to the genera *Aedes*, *Culex*, and *Anopheles* have been shown to be hosts for the development of heartworm larvae. Brown and Sheldon⁹ have found the infective stage of *Dirofilaria immitis* in naturally infected fleas. In the San Francisco Bay area Freeborn¹⁰ states there can be found *Culiseta incidens*, *Aedes dorsalis*, *Aedes squamiger*, *Culex pipiens*, *Culex tarsalis*, and *Anopheles occidentalis*. The common dog flea is widespread.

Summary and Conclusions

Sixty cases of canine filariasis have been found, of which 38 were in dogs proven never to have been out of the state of California. The centrifuged serum method was found most accurate for diagnosis. Twenty-nine cases were treated, with one mortality. Clinical results from treatment were good to excellent. Comparing the infection seen in native California dogs with that observed in dogs known to have been infected in the south, the conclusion is reached that the infection in northern California is not as severe as that seen in the southern states.

It is possible that canine filariasis has become enzootic in the San Francisco Bay region, for 38 naturally infected dogs were found here, and it is known that insect vectors of the disease are present here.

⁹Brown, H. W., and Sheldon, A. J.: "Natural Infection of Fleas with the Dog Heartworm (*Dirofilaria immitis*)"; 1940. *North Amer. Vet.*, 21: 230-231.

¹⁰Freeborn: "The Mosquitoes of California". Univ. of Calif. Pub., 1936.

The Cattlemen's Association will hold their annual convention December 8, 9, 10, with headquarters at Palace Hotel, San Francisco.

Veterinarians, Attention!

Senate Bill 1005, the law relating to \$5.00 hypnotic drug license, will go into effect November 1. All material pertaining to this new law, and application to obtain license, will be mailed to all concerned parties, *Veterinarians included*, before the deadline date.

Progress in Calf Vaccination for Control of Brucellosis

By DR. A. K. CARR, *Chief, Division of Animal Industry,
California Department of Agriculture*

The official calf vaccination program for control of brucellosis in cattle has now been in effect for more than a year and a half. The vaccination of calves under the State Brucellosis Control Law began on January 2, 1948. The law requires that all female dairy calves must be vaccinated against this disease. The law provides for the vaccination of male dairy calves and beef breed calves if the owner so desires.

The vaccination of calves as provided by this law is for purpose of developing immunity in young stock against brucellosis and as these animals become the future herds, brucellosis in cattle gradually will be controlled.

The progress has been very favorable considering that the program is statewide and must reach all places where dairy cattle are maintained. The records for the past 19 months (to July 31, 1949) show a total vaccination of 315,667 calves on 26,914 ranches. This total consists of 251,580 dairy calves and 64,087 beef calves.

The requests from owners for vaccination of beef calves are increasing. There were more beef calves vaccinated during the first six months of 1949 than during the entire 12 months of 1948. The vaccination of both dairy and beef calves so far this year has averaged about 20,000 calves per month.

The calves are vaccinated between the ages of 6 and 12 months. This age period permits vaccination of all calves by making two trips a year to each place.

Most of the vaccinations are conducted by accredited practicing veterinarians who have contracts with the Division of Animal Industry, State Department of Agriculture, for that purpose. Federal and state veterinarians also can vaccinate calves. This has only been done in a few areas where contract veterinarians are not available. At this time there are 252 accredited practicing veterinarians holding contracts to vaccinate calves.

The brucellosis vaccination service is free to the owners. The State furnishes the vaccine and pays the contract veterinarians for each calf vaccinated. The owner selects the veterinarian whom he wishes to do the work. The State Department of Public Health tests all vaccine for potency before it can be used in this program.

During the first six months of 1948 liquid type vaccine was used. A difficulty was encountered with this type of vaccine. It is an extremely delicate product and had to be used very quickly after manufacturing. Consequently only small amounts could be ordered,

otherwise it became outdated before it could be used. On July 1, 1948, a change was made to dry vaccine, which is more stable and has a year's expiration dating. The dry type vaccine has been found to be very satisfactory in this program.

All calves officially vaccinated in this program are tattooed in the left ear for purpose of identification. The law provides that the tattoo shall show the month and year of vaccination. This requirement was changed by the 1949 legislature so that the tattoo will show the quarter of the year in which the vaccination was conducted, and this change will be effective on October 1, 1949.

In accordance with a provision of the law, the U. S. Bureau of Animal Industry entered into agreement with the State Department of Agriculture making the official vaccinations of calves a Federal-State cooperative program. An agreement for this purpose was made on August 24, 1948. The cooperative arrangement at this time does not provide for Federal funds to purchase vaccine or pay contract veterinarians. Federal veterinarians have assisted in organizing the work and in some of the remote areas assisted in vaccinating calves. In addition, certain Federal veterinarians have been assigned for temporary periods in some counties to contact owners for lining up calves to be vaccinated by the practicing veterinarians. This contact work has proved to be very valuable in speeding up the work and getting calves vaccinated.

A problem in this program is to get all of the small lots of one and two calves vaccinated. Vaccination of the small lots entails considerable time and much travel and is not profitable business for the contract veterinarians. Consideration has been given to this problem and it might be necessary for Federal and State veterinarians to vaccinate many small lots of calves in connection with other work in certain areas. Another difficulty in the program is that owners sometimes fail to notify veterinarians when they have calves that should be vaccinated. Post card reminders to owners have been tried in some places for purpose of keeping calf vaccinations on schedule.

Excellent cooperation has been received from cattle owners and from many organizations in promoting this program. It is difficult to attempt to name all the agencies that have been active in arranging for vaccinations of both dairy and beef calves.

Insecticides and the Practitioner

By JAMES R. DOUGLAS, *University of California, Davis*

An appropriate title for any general discussion of insecticides at present might be "A Study in Confusion." The chemists have far outstripped the entomologists. Thousands of new compounds are being synthesized each year. These are screened in the laboratory using a few species of insects in order to select those that show some promise. Then, in order to determine which will be useful, they must be field tested under many different conditions, in different localities, on different plants or animals, against a wide variety of insects. At the same time it is essential to determine what possible hazards may result from the use of these materials. Is there any danger involved in applying them? Do they produce long lasting residues which may result in a hazard to man or to animals ingesting the plants on which they were applied? What happens when they are applied to animals? Are they absorbed by the skin? Are they readily metabolized or do they accumulate in the tissues. Do they appear in the milk of lactating animals? These are questions of more than academic interest. It is absolutely essential that the answers be supplied before the materials are recommended for general use. Therein lies the crux of the problem.

Insecticides represent big business, millions of dollars are invested in research development and manufacturing facilities. As evidence of development in the field, there are now more than 8,000 products registered as economic poisons in California, the major portion of these being insecticides. There is therefore, the keenest type of competition for the available market. The slightest advantage is fully exploited. Recommendations may be based on incomplete evidence and issued with the fervent hope that they will be successful; often they are not.

Investigations necessary to establish the value and safety of an insecticide are essentially slow and costly procedures requiring the cooperation of many trained scientists. One of my colleagues has recently stated that, in his opinion, the period required for adequate development and investigation of a new insecticide should not be less than five years.

As an example of what can happen when an insecticide is not sufficiently investigated, I would like to review briefly the history of DDT. The insecticidal properties of DDT were discovered by a Swiss chemist, Paul Muller in 1936-37. In the summer of 1942, 200 pounds of formulated DDT materials were exported to the United States. In October of 1942 samples were made available to the U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, along with reports of some of the Swiss results. It was

soon found that DDT was effective against a great many insects and pilot plant production was begun in May 1943. Rapid expansion of production facilities resulted in an output of about three million pounds per month by the summer of 1945. In August of that year it was released for civilian use.

During the period 1942-1945 intensive investigation of DDT was being carried on by Federal and State workers throughout the country. These included not only studies to find possible new uses for DDT but studies to determine possible hazards resulting from its use. By the end of 1945 DDT was being generally recommended by Federal and State workers for use on livestock. It was particularly useful in the control of flies on cattle and was in wide use by dairymen for this purpose.

In the meantime research workers were continuing to examine the toxicological aspects of the use of DDT. It was found that while the acute toxicity of DDT was not particularly high, very low levels in the diet of laboratory animals produced pathologic changes, notably in the liver, when continued over a long period of time. Since it was known that DDT appeared in the milk when fed to dairy cows, these results were of immediate concern.

On February 18 of this year the following statement was issued by the Mid-western office of the Food and Drug Administration to the Evaporated Milk Association:

"DDT has cumulative effects. It is not a safe pesticide for spraying dairy cattle or for spraying the interior of dairy barns. . . .

"Direct spraying of cows results in penetration of DDT through the skin and is appearance in the milk. Spraying of walls and other surfaces inside empty barns with DDT can even result in contaminating milk of cows stabled in such barns after such spraying operations. It is believed that the transfer is by inhalation by the cows of vaporized DDT residues from walls and other surfaces."

On March 24, the Bureau of Entomology and Plant Quarantine recommended that DDT not be used on dairy cattle or in dairy barns. On April 7 the Production and Marketing Administration issued a notice to Manufacturers, Registrants, and Distributors of insecticides containing DDT that labels must be revised so that the materials are not recommended for use on dairy cattle, dairy barns, forage fed to dairy cattle, or cattle being finished for slaughter. Products not bearing labels conforming to this notice are barred from interstate commerce. On May 13 a notice similar to the foregoing was issued by the California

Department of Agriculture, Bureau of Chemistry, to registrants of this state. It should be added also that in California until more information is available the same restrictions apply to other chlorinated hydrocarbons such as Benzene Hexachloride, Chlordane, DDD and Toxaphene but not including Methoxychlor. These materials will be discussed in more detail later. This is the history of DDT especially as it relates to dairy cattle. We have completed a full circuit and arrived back where we started secure in the knowledge that we were wrong for four years. We have learned our lessons the hard way and I sincerely hope we will proceed in the future with more information and less enthusiasm. Would it not be much wiser to get all the essential facts before determining a course of action? It is my belief that our recent experiences with DDT will have a very salutary effect in this regard.

I should like to consider now some of the insecticides which are of interest to the veterinary practitioner. The list includes only those which are on the market at the present time. Others will soon appear but until they have completed the essential developmental and testing period mentioned earlier it is not possible to predict where they will find a field of usefulness.

1. DDT—This is the oldest of the modern chlorinated hydrocarbon insecticides. In spite of its shortcomings it is still an extremely useful material. As mentioned previously, its acute toxicity to mammals is not high, being of the order of 250 mg./Kg. on oral administration. On animals it will do a good job on lice, keds (sheep ticks), horn flies, fleas and has been found useful in preventing fly strike in sheep. It is not effective against most ticks, mites, horseflies and deerflies.

Recently it has been found that houseflies in many localities in the United States and Europe had developed a resistance to DDT. While the exact mechanism which brought this about is not too well understood, the fact remains that it will not give satisfactory control in many instances. Houseflies have been found in some localities which require several hundred times as much DDT as is required to produce the same percentage kill in non-resistant strains. So far as is known at present the housefly is the only insect exhibiting resistance to DDT.

Before leaving DDT I should like to emphasize that notwithstanding statements which have appeared in journals of Veterinary and Human medicine and in the public press, there is no factual evidence to indicate that DDT intoxication is responsible for the so-called X-disease in cattle or in the virus X syndrome in man.

2. Methoxychlor—This is an analogue of DDT and differs from it primarily in its tox-

icity to mammals, which is less than one twenty-fourth that of DDT. It appears to be safe to use on animals in practically any concentration. At present it is the only chlorinated hydrocarbon which may be recommended for use on dairy cattle, in dairy barns or on forage to be fed to dairy cattle.

In general, Methoxychlor is equivalent or slightly less toxic than DDT to insects. While it is being recommended for the control of houseflies in dairy barns, evidence is accumulating which indicates that houseflies resistant to DDT may soon become resistant to Methoxychlor also.

3. DDD—This is another analogue of DDT, and is about one tenth as toxic to mammals. It has not been used to any degree on animals. In general, its insecticidal properties are on a par with DDT and Methoxychlor.

4. Toxaphene (or chlorinated camphene)—This insecticide was thought at one time to show considerable promise for use on livestock. Its acute toxicity to mammals is about four times that of DDT but at chronic levels it is readily detoxified so there is no accumulation in the tissues. However, it has a facility for penetrating the skin and with the relatively large amounts employed in spraying animals the margin between a safe level and a toxic level is small. Against insects Toxaphene has about the same order of effectiveness as DDT, although it is somewhat slower in action.

5. Chlordane—This compound possesses about one-half the acute toxicity of DDT to mammals and has been used to some extent for the control of animal pests, particularly flies, mites, ticks, and lice. As with Toxaphene there appears to be a rather narrow margin of safety between the amount necessary to control the pest and the toxic level. Against many insects Chlordane is more toxic than any of the materials previously mentioned.

6. Benzene Hexachloride (BHC, 666, Gam-mexane)—Early samples of this compound consisted of mixtures of five isomers in various amounts. Only one of these, the gamma isomer, was of any interest as an insecticide. The other four isomers however contributed an extremely disagreeable odor to the product and seriously limited its field of usefulness because of the danger of imparting the odor to plants or the flesh of animals. Improved methods of production have resulted in a higher degree of purity with respect to the active isomer and a marked reduction in odor. One company makes a product which for all practical purposes is technically pure.

The acute mammalian toxicity of gamma Benzene Hexachloride is about twice that of DDT while the chronic toxicity is about one-fourth as great.

Against many animal pests, particularly lice, ticks and mites, including the mange

mites, this is an extremely useful material. It has the property of killing louse eggs, a factor which greatly simplifies one treatment control operations. In general its toxicity to insects is several times that of DDT, which permits use of smaller amounts and minimizes hazards to animals.

The products on the market at present vary considerably in their gamma isomer content. Labels should always be carefully checked before the material is purchased or used.

7. Rotenone—This insecticide, in contrast to those just discussed, is not a synthetic. It is found in the roots of certain plants such as derris or cube which are either ground for use in dusts or wettable powders or extracted with suitable solvents.

Rotenone exhibits considerable species variation with respect to its mammalian toxicity but it is nevertheless one of the safest insecticides in general use. It is furthermore, a very effective insecticide for use in the control of lice, sheep ticks and cattle grubs. Against the latter parasite it is the only insecticide found to be satisfactory.

As compared with the chlorinated hydrocarbons previously discussed, rotenone has insignificant residual qualities and two applications may be necessary to obtain satisfactory control of insects such as lice. Hydrogenation of rotenone increases its staying power slightly but it still does not compare with the chlorinated insecticides.

I should like to mention here that, so far as cattle grub control is concerned, only wettable suspensions containing rotenone have proven effective. In a series of experiments over the past two years rotenone extracts were found to give control directly proportional to their rotenone content. Cost of the materials usually prohibits use of rotenone extracts at concentrations essential for adequate control. One widely used proprietary rotenone extract formula, when used according to directions, gave only a six per cent kill of grubs.

8. Pyrethrum—This is another naturally occurring insecticide, being extracted from certain species of flowers of the chrysanthemum group. It has been in use many years, primarily as the active ingredient of space sprays for the control of flies, mosquitoes and other flying insects. It is similar to rotenone in its toxicity to mammals and presents no hazard whatever in normal usage. Like Rotenone, Pyrethrum possesses practically no residual properties. It would appear to have very limited usefulness in the field of veterinary pest control.

9. Piperonyl cyclonene and piperonyl butoxide—In the strict sense these are not insecticides, they are classed as synergists or activators of Pyrethrum and Rotenone. It is

possible, for example, to reduce the Pyrethrum content of an insecticide formula by the addition of one of these compounds without reducing the insecticidal efficiency. They are practically non-toxic so far as mammals are concerned and it is possible they will find a wide field of usefulness as a result of experimental work being conducted.

I should like to mention briefly a final group of insecticides, the phosphates, not because they are useful in the control of animal pests but because they are so toxic they should, under no circumstances, be used on animals or where animals may be exposed to them.

Included in this group are TEPP, (tetraethylpyrophosphate) and Parathion. The acute oral toxicities of these compounds range from two to seven mg./Kg., thirty-five to one hundred twenty-five times that of DDT. Although they should be used with great care, the residues produced are rather transient, and barring accidents, do not present a serious problem so far as animals are concerned.

Although the various insecticides discussed earlier are on public sale, many of them for use on animals, it should be emphasized that in *not one case* is our information with respect to animal toxicity sufficient to allow us to proceed with absolute confidence. As the investigations continue our viewpoints change, materials thought to be completely safe may be found to have unforeseen characteristics which will prevent their use. On the other hand some compounds originally considered to be too toxic for use on animals may, on further investigation, be found suitable for use under certain conditions.

Insecticides designed for use on animals are in a broad sense drugs. They are chemotherapeutic agents administered to correct a diseased condition and it is my contention that they should be prescribed and administered with the same care and with the same background of information accorded the prescription and administration of other drugs.

The responsibility of the practitioner in this respect extends beyond the prescription and administration of agents under his control or direction. His advice is often solicited. Simply because he is not compensated for such advice, his moral responsibility for what may happen as a result thereof is not lessened in any degree.

This is a rapidly developing field and one which we can confidently predict will result in significant increases in the general health and welfare of our animals. However, let us proceed on a sound rational basis making haste slowly and avoiding the pitfalls resulting from misplaced enthusiasm.

ANIMAL RABIES

By BEN N. DEAN, D. V. M.,
Public Health Veterinarian

Rabies, primarily, is a disease of the canine species, spread by the biting and fighting habits of these animals.

The disease is often maintained at a low incidence, but will survive from year to year due to the long incubation period.

Epizootics do occur, but usually last only a few months and then die down to sporadic cases, which continue to appear, unless strict control measures are adopted.

Rabies is reported from all climates and at any time of the year. Peaks usually occur in the late winter and spring.

Dogs and cats are responsible for 99 per cent of human infection. There is slight danger of man developing rabies by contact with contaminated objects or by ingestion (by drinking milk from a rabid cow or by eating flesh of infected animals).



BEN DEAN

Public Health Veterinarian in the Acute Communicable Disease Service of the State of California Department of Public Health.

The incubation period may vary from 10-200 days, with an average around 42 days.

Usually two types of canine rabies are described, furious and dumb, but symptoms of both types are often shown in the same case. The symptoms shown probably depend primarily on the virulency of the virus, age of the animal, and species of affected animal. Furious rabies is the classical "mad dog" type; while in dumb rabies, depression and paralysis are the outstanding symptoms. The disease is practically always fatal. Wild animals affected with rabies lose their normal fear of man and will often attack man and animals.

In California, reported cases of animal rabies vary from 300 to 2,000 per year, primarily in Southern California. Some counties (Sonoma, Napa, Lake, and San Diego) have a wild ani-

mal rabies problem, involving primarily foxes and skunks.

A rabies study committee has been appointed to determine the extend of rabies problem in California. This committee will make recommendations, depending upon the findings, as to control measures.

Enrollment at Davis Expanding

Fifty students will be admitted in the second class to enter the University of California School of Veterinary Medicine this fall. Dr. George H. Hart, dean of the school, says notices of acceptance have been sent to this many applicants.

Work in the School began a year ago with 40 students, in laboratories and classrooms that were available for the work. Some difficulties were encountered but excellent progress was made, it is said, and with the facilities offered in the new \$3,500,000 building that will house the school, Dean Hart believes that 50 students can be handled satisfactorily, and without lessening the quality of instruction.

"Whether we can enlarge this further will depend upon developments after we determine the capabilities of the new building," says Dean Hart. "If clinical instruction can be given successfully to a class of more than fifty, more will be admitted. However, we are not proposing to dilute the quality of our work by spreading our efforts over numbers larger than we can care for properly; we want our men as well trained, or even better trained, than any in the country. We are anxious to aid the livestock industry of the state by turning out as many doctors of veterinary medicine as we can, but we must give first consideration to the quality of our graduates, rather than to the quantity."

Work on the new veterinary medicine building is progressing well. It is believed that it will be completed during the fall semester and that the second year's work will be under more favorable conditions as regards both classrooms and laboratories.

Government Service Openings

There are many openings in the Government Service at this time. Temporary employment on Foot and Mouth Disease Eradication in Mexico. Permanent positions on Meat Inspection, Field Inspection, Virus-Serum Control, Research and Poultry Inspection. The permanent positions usually are filled by Civil Service examinations. However, some appointments are made on experience. Entrance salaries have been raised and progressive advances are made periodically. Liberal retirement features are included.

For further information write: Personnel Division, United States Department of Agriculture, Washington, D. C.

Pathological Basis for Hormone Therapy of Abnormalities of the Canine Prostate

By LOGAN M. JULIAN, *University of California*

Three major pathological conditions of the prostate of the aged dog are of significance to veterinary practice. They are prostatitis, or true inflammatory conditions, benign hyperplasia, and carcinoma. These pathological and oftentimes clinical states are usually grouped incorrectly in the general category of "prostatitis." Only one of the three conditions is truly inflammatory; the others, benign hyperplasia and carcinoma, are growth disorders.

True inflammatory conditions of the prostate may be common at any time after sexual maturity. Acute prostatitis causes local symptoms as well as generalized symptoms of an acute inflammatory condition. Chronic prostatitis apparently is common, but usually shows few clinical symptoms unless the chronic condition causes marked enlargement of the gland with resultant anuria and other secondary symptoms of prostatic enlargement. Mild inflammatory lesions may often be found in pathological examination of prostates which are enlarged by benign hyperplasia. In these cases, the two conditions exist simultaneously.

Carcinoma of the canine prostate is rare.¹ Few case reports are to be found in the veterinary literature.

Benign hyperplasia or benign hypertrophy is by far the most common cause of prostatic enlargement. It occurs in a high percentage of dogs over 5 years of age. The name, benign hypertrophy, is borrowed from terminology pertaining to human pathology. The term "benign" does not refer to the clinical syndrome which may produce effects far from benign. Rather, it is used to contrast benign hypertrophy of the prostate of the human with true malignancies. The condition as found in dogs is actually hyperplasia of the gland; thus the term "benign hyperplasia" appears more accurate.² The increase of total size of the gland is due to an increase of epithelial elements of the prostate with a more or less parallel increase of fibrous elements.

Functional Anatomy of the Prostate

The canine prostate of the mature animal is a bilobed spherical mass situated just behind the bladder. It may be examined by digital palpation in average sized dogs unless the bladder is full, in which case the heavy bladder may drag the prostate forward into the abdominal cavity. The organ may be classified morphologically as a compound tubuloalveolar gland. Secretory tissue completely

surrounds the urethra. The prostatic secretion enters the urethra by way of numerous secretory ducts. The glandular acini are normally lined by a single layer of tall columnar epithelium. The height of the epithelium and its histological character show a correlation with the functional state of the organ. The clumps of alveoli are separated by collagenous connective tissue. The connective tissue is of particular interest in that it contains numerous smooth muscle fibers. The gland is covered by a deflection of the pelvic peritoneum.

Histologically, the prostate closely resembles the mammary gland. Physiologically, there are other striking similarities of the two organs. Both the mammary gland and prostate are secretory secondary sex glands and are under the functional control of the endocrine system. Also, the growth of the two organs is controlled by the endocrine system. The prostate, like the mammary gland, has a growth pattern correlated with the maturity and age of the animal. The prostate is relatively small in the inactive male. At maturity and until the fifth year of life, the prostate of the dog weighs from 0.1 to 0.7 grams per kilogram of body weight.³ After five years of age, the gland reaches a critical period in its structure. Normally, as sexual activity decreases, the prostate, as other secondary sex structures, decreases in size until a state of senile atrophy is reached. However, in a large number of cases, the gland does not decrease in size but rather increases and enters into the state of benign hyperplasia. The factors bringing about this seemingly paradoxical situation are unknown. However, important facts concerning a basis for rational therapy of this condition may be had from consideration of the available information pertaining to the influence of endocrine products upon the gland.

Benign Hyperplasia: An Endocrinopathic Condition

Benign hyperplasia, the most common cause of prostatic enlargement in the dog, results in a uniformly enlarged gland which in advanced cases may be readily detected by palpation. The gland is soft and fluctuating. Histologically, the most striking change occurs in the epithelium. The epithelium changes from a single layer of tall cells to a state which appears to be pseudostratified. The epithelial cells are crowded together, resulting in stalk-like projections which project into the acinar cavities. The smooth muscle

¹Schlotthauer, Carl F., and Millar, J. A. S.: *Amer. Vet. Med. Assn. Jour.*, 99, 239, 1941.

²Julian, Logan M.: *The Cornell Veterinarian*, 37, 241, 1947.

³Schlotthauer, Carl F.: *Amer. Vet. Med. Assn. Jour.*, 90, 176, 1937.

of the connective tissue stroma does not appear to be increased. The change may be said to be primarily epithelial. It has been found that the increase of prostatic tissue is not accompanied by an increase in function. In fact, the enlarged prostate is less active than the small normal gland.⁴ Thus, the condition is a true hyperplasia according to classical definition.

A second variety of prostatic hyperplasia has been reported in dogs suffering from testicular neoplasms of a particular type. The second type occurs rarely and is of interest to practitioners from the standpoint of its possible occurrence as a sequale to tumors of the testicle. The epithelium of the affected gland loses its tall, columnar characteristic and becomes low, flat, and in advanced cases, stratified. The most marked change, however, is an increase of the smooth muscle of the stroma. The two changes, smooth muscle hyperplasia and epithelial metaplasia, result in an enlarged, hard prostate gland.

The literature contains reports of experimental studies which may be used in better understanding the causation of these two varieties of benign hyperplasia. Zucherman and coworkers have produced prostatic hyperplasia of a type pathologically identical to natural cases by the administration of high concentrations of male hormone.^{5,6} Other work with smaller experimental animals has shown that the tall prostatic epithelial cell, such as is seen in the normal, active young male and such as is seen in benign hyperplasia, is dependent upon male hormone. Therefore, it would appear that the most common variety of prostatic enlargement of the dog is an endocrinopathic condition resulting from stimulation by endogenous male sex hormones.

Zucherman and others have shown that the smooth muscle of the prostate is similar to the smooth muscle of the uterus in that it is sensitive to sex hormones.^{5,6} In the case of the prostate it has been found that excessive amounts of estrogens will produce smooth muscle hyperplasia. It has been stated that the type of prostatic enlargement resulting from smooth muscle hyperplasia is seen in dogs which are suffering from a concurrent testicular tumor of a particular type. Pathological studies of the tumors associated with this variety of prostatic hyperplasia have shown that the Sertoli, or nurse cells of the testicle, are involved. The Sertoli cells are thought to be responsible for the production of estrogens in the male, since they are homologous of the estrogen producing cells of the ovary.^{4,5}

⁴Huggins, Charles: *Physiol. Rev.*, 25, 281, 1945.

⁵Zucherman, S., and Groome, J. R.: *Jour. Path. and Bact.*, 44, 113, 1937.

⁶Zucherman, S., and McKeown, T.: *Jour. Path. and Bact.*, 44, 7, 1938.

Summary: Clinical Implications of Pathological and Experimental Studies

The importance of the enlarged canine prostate as an obstruction to urinary flow has been questioned by Huggins and Clark⁷; however, the veterinary literature contains numerous accounts of urinary obstruction as a result of prostatic pathology, and it is generally recognized that prostatic enlargement may be a cause of anuria in the old dog.^{8,9,10,11,12} Since the prostate completely surrounds the urethra, it may be seen that enlargement of the parenchyma could create pressure upon the urethra. Furthermore, the enlarged gland encroaches upon the other organs of the pelvic cavity. An enlarged prostate may interfere with normal defecation and as a sequale to this condition, it has been incriminated as a causative factor in the formation of perineal hernia.

In summary, it may be said that of the pathologies involving the prostate of the aged dog the most common, benign hyperplasia, is associated with an alteration of hormone metabolism. The more common of the two types of benign hyperplasia appear to involve excessive androgen stimulation. The tall, columnar hyperplastic epithelium which may be produced by experimental injections of androgens is a constant finding in pathological studies of prostates of old dogs. It should then follow that the common practice of treating male dogs suffering from prostatic enlargement, due to benign hyperplasia, with synthetic female hormones, has a basis in experimental studies of pathology and physiology of the prostate gland. Female hormones would not be indicated as treatment of the rare type of prostatic enlargement associated with testicular tumors which secrete excessive female hormones. Castration of the animal, in removing the neoplastic testicle, removes the source of stimulation of the prostate. If the gland is excessively enlarged and hardened by the excessive smooth muscle growth and metaplasia of the epithelium, possibly replacement therapy with androgens would be of benefit if clinical symptoms indicate it.

Benign hyperplasia of the prostate of the human is often treated by surgical removal. Because of a fundamental difference in the histopathology of the condition found in the human and that seen in the dog, no analogous surgical procedures have been developed. Except for the technique reported by Harter,⁸

(Continued on page 27)

⁷Huggins, C., and Clark, P. J.: *Jour. Exper. Med.*, 82, 747, (1940 as cited by Huggins, C., *op. cit.*, item 12).

⁸Gadd, John D.: *Amer. Vet. Med. Assn. Jour.*, 104, 15, 1944.

⁹Huggins, Charles: in *Nelson's Surgery*, vol. 6, Thomas Nelson and Sons, New York, 1941.

¹⁰Milks, H. J.: *Cornell Vet.*, 24, 87, 1944.

¹¹Schlotthauer, Carl F.: *Amer. Vet. Med. Assn. Jour.*, 90, 176, 1937.

¹²Kirk, Hamilton: *Index of Diagnosis*, 3rd Ed. Baltimore, Williams & Wilkins, 1947, p. 100.

Compulsory Rabies Vaccination in San Bernardino

*Paper presented by GLENN H. KENASTON,
Participating Practitioner, C.S.V.M.A., Annual June Convention*

Rabies in dogs has been more or less prevalent in San Bernardino County and City for many years, at times assuming epidemic proportions. Several times, in past years, health authorities, and other interested groups, have attempted to cause to be drafted, some plan or ordinance, to gain control of this problem; the usual things, however, have always happened to their efforts. Pressure groups, such as local kennel clubs, misguided humane organizations, anti-vivisectionists, and the usual fanatics, always swarmed down en masse to throttle any attempt to enact a sensible solution to the problem.

Beginning about Armistice Day, in November, 1946, we began to see the first of a very dangerous outbreak of rabies in the city of San Bernardino. From that date in 1946 until Armistice Day, 1947, I saw in my own hospital, and kept there a total of 55 dogs, who showed and died with clinical rabies symptoms. The heads were all checked in the county laboratory for brain lesions, and inclusion bodies were found. Granted, that neither clinical symptoms, nor microscopic evidence is infallible, it still gives an idea of how widespread the epidemic had grown.

Dr. Bateman, our county veterinarian, had attempted many times to get the county supervisors to adopt a rabies control ordinance, but had met with little or no cooperation. Much of the news about the number of rabies cases, and exposed people had reached the newspapers, as such things always do, until Dr. Bateman saw a chance to really bring pressure to bear for enactment of a control ordinance and through the help of local veterinarians and the local mayor was able to get all of the city governing bodies of all communities in the county to meet for the purpose of enacting ordinances. These ordinances were drawn up, all very similar to the one adopted by the county and the City of San Bernardino.

After the thing really got to rolling there was very little resistance to it, practically none of it organized. Since there existed a true emergency, it was decided to set up some sort of rabies vaccination clinic, whereby the people who owned dogs could have them inoculated with the least inconvenience and cost to themselves.

In the City of San Bernardino, the veterinarians agreed to vaccinate dogs at city fire halls, the city furnishing all clerical and other help needed. The veterinarians to furnish the vaccine and their services at the rate of \$1.00 a head. In a nine-day period we inoculated over 3,500 dogs, working from 9 a. m. until

12 noon and from 6 p. m. until 9 p. m. All people who were in line at 12 noon and at 9 p. m. were taken care of; all who showed up after the stated time of closing the clinics were required to come back at a later date.

Other cities in the county set up similar clinics and the county also, carried on with inoculation centers all over the county until by June 16th of 1948 all dogs who were presented at clinics anywhere in the county had been taken care of. The total number of dogs inoculated during the year of 1948, including county and all incorporated areas, both in clinics and those done in hospitals, at the regular fee of \$3.00, was over 23,000.

Publicity for the program was accomplished by having time and date schedules published in daily newspapers, frequent broadcasts over local stations and notices given to school children to take home.

A schedule was worked out whereby veterinarians were assigned to the clinics on a rotation basis.

Different methods of attempting asepsis were used. Most of us using some sort of cold sterilization. I used 75% isopropyl alcohol for 5 cc. syringes with 20-gauge $\frac{5}{8}$ -inch needles. Using glass butter dishes, I filled them about half full of the alcohol, four syringes to the dish, in all having 12 syringes. After each dog, I removed the plunger from the syringe, immersed it in alcohol and taking another syringe would rinse it with isotonic salt solution from a rubber diaphragm stoppered bottle and used it on the next dog.

We used no restraint whatsoever on most of the dogs, having the owner lift them onto a solid table, turn them so that they were facing directly away from us and toward the owner, asking the owner to shield the dog's eyes with their two hands, but not to apply any restraint on the dog's body. It was surprising how little confusion resulted. A veterinarian can inoculate 100 dogs an hour operating in this manner.

Abscesses? Of over 1,500 dogs, which I personally vaccinated, I saw only five with anything approaching severe local reactions. The first two of these I opened on the fifth day after the injection and found straw-colored fluid. The other three I advised doing nothing with and they gradually absorbed. The experience of other veterinarians doing the work were comparable to my own.

Dosage of vaccine varied from two to ten cc. depending on size, age and condition of the animal, and was distributed into two sites, usually on either side of the neck just ahead of the scapula.

This year, in the City of San Bernardino, we set up similar clinics, but did not meet with the amount of response received last year. In all, we inoculated over 2,400 dogs in 11 days. Lack of interest, we feel, was due to the fact that since the campaign of last year, only four cases of rabies had been reported, two of them occurring within a few weeks after the clinics of 1948.

I quote from a letter received on April 7th of this year from the City Humane Officer, "Please be advised that in the year 1947 we had 98 cases of rabies: 22 persons had taken Pasteur treatment due to bites from these dogs. In January, 1948, the city passed an ordinance, No. 1810, making it compulsory for all owners of dogs over six weeks of age to be vaccinated annually. In the same year we had only four cases of rabies. Our investigation of these cases revealed that two of these dogs had been in dog fights prior to the time that they were inoculated. So far in the year of 1949 there have been no cases of rabies reported in the City of San Bernardino."

The county started its campaign in the unincorporated areas on May 1st of this year, and so far has accounted for over 6,000 dogs as compared to a total last year of 11,499. We know that a portion of the dogs inoculated in public clinics last year are using the services of their veterinarian at the regular fee, rather than stand in line at the clinics. This then, along with the fact that we do not have figures on the number of dogs inoculated in incorporated areas other than the City of San Bernardino, undoubtedly accounts for the wide difference in figures. All ordinances state that dogs must be inoculated annually and certificates of such presented when new licenses are applied for. Most tardy and reluctant owners will be detected in this manner. Regular canvasses are being made by humane officers to check on unlicensed and delinquent dogs.

In answer to inquiry, I received these figures from the County Health Department. In 1946, 23 positive rabies cases; in 1947, 128 positive rabies cases; in 1948, 23 positive cases. All of these cases for 1948 being reported before the county had completed the vaccination program. Dr. Bateman told me a few days ago that the cost to the county for Pasteur treatment for indigents during 1947 amounted to over \$14,000.

If any of you people present are interested, and we hope you are, in establishing rabies control ordinances in your communities, copies of the San Bernardino County rabies and licensing ordinance can be procured through Dr. Bateman's office, County Court House, San Bernardino. The city ordinance may be obtained through either myself or Humane Officer, City Hall, San Bernardino.

Abnormalities of Canine Prostate

(Continued from page 25)

surgical manipulation of the canine prostate has been attempted primarily as an experimental procedure. Harter reports a method by which the enlarged, hyperplastic prostate may be opened into the pelvic and abdominal cavities, releasing the internal pressure exerted against the urethra. Since prostatitis with abscession may be a common concurrent condition, it would appear that this method may be attended by some danger to the animal.

True prostatitis and inflammatory reactions induced by bacteria are treated as bacterial infections. However, since benign hyperplasia may be a concurrent condition, especially in the older dog, estrogen therapy may again be indicated. Estrogens in contracting the normal maintenance levels of endogenous androgens would give the organ a temporary period of inactivity.

The few reported cases of carcinoma of the prostate of the dog indicate that whereas the canine prostate is rarely subject to true neoplasia, the type of neoplasm should be sensitive to hormone therapy. The reports of post-mortem findings indicate that the carcinomas are of an adenocarcinomatous type rather than the scirrhous type more often seen in man. Prostatic tumors of man have been found to react to estrogen therapy and such treatment might be successful in a canine case should a diagnosis be arrived at in the ante-mortem state.

Therefore, in conclusion it may be said that use of estrogens in therapy of the pathologies of the canine prostate has a rational basis in the results of pathological and experimental studies. These studies indicate or suggest that only in an occasional rare case of enlargement, as a result of testicular neoplasms, would such therapy be contraindicated.

September Meeting of MBAVMA

The September meeting of the Monterey Bay Area Veterinary Medical Association was topped off with a round table discussion of sex hormones in animals. The following observations were among the many made:

Dr. Hammond: Has used stilbestrol successfully in a mare which had an ovary the size of his fist and no heat period for 6 months. In 5 days the mare was in heat, conceived and now has a beautiful colt. He also has used stilbestrol in small animals, particularly in a Scottie with enlarged prostate.

Dr. Harrison: The sex hormones have given excellent results in mink raised in captivity.

Dr. Outhier: Believes that hormones given wide publicity have sometimes been used indiscriminately. He has had success with ovarian and orchitic substances on cats.

Historical Review California State Veterinary Medical Assn.

By JOSEPH ARBURUA, D.V.M.

(Continued from last issue)

One cannot but again comment on the large class that presented itself before the board (as was done in 1903) at a time when new restrictions were about to be imposed and it behooved them to qualify without loss of time. As in 1903, many of this class must have practiced without serious concern of the existing state law.

After disposing of the above matter, the Board of Examiners set about preparing to complete the work of the old board in regard to an authentic roster of the licensees of the State. They required every licensee to register by making an affidavit stating that he was licensed by the California State Board of Veterinary Examiners and when he was so licensed. A fee of one dollar was charged to defray the expenses incurred. The first roster was issued in 1908. Albeit it was not complete; each licensee was given a consecutive number as nearly as possible in the order it had been originally issued.

As time passed new names turned up. The problem of consecutive numbers in the order in which they were granted was solved by adding letters to numbers already assigned. It will be noted in the present roster of state licenses that more than one person may have the same license number but followed by a different letter. This is particularly true of those licensed in 1905. This was subsequent to the time the "Western Veterinarian" aforementioned was published. This explains the presence of license numbers 195B, 195E, etc., which are still active.

It was not long after the enactment of the practice act before its constitutionality was questioned. In 1908 Judge Ogden of Oakland, while sitting on a case against an illegal practitioner ruled against sections three and eight of the act.

Section three defined the qualifications necessary for an applicant for a license to practice veterinary medicine and made it necessary for the applicant to be examined by the board.

Section eight protected those already licensed, army veterinarians, those licensed in other states not opening an office in this state and those who worked for veterinarians licensed to practice in this state.

Competent legal talent employed by the Association advised continuance of prosecutions on the basis that the law was constitutional. Though a precedent had been established by the ruling of Judge Ogden, the question does not seem to have seriously affected the prosecution of quacks who were from time to time arrested and tried with varying results, even as now.

Nevertheless the Ogden decision started the favorite biannual indoor sport of California veterinarians of attempting to change and amend their practice act. The first attempt was made in 1909. The State Association introduced a bill. Though it passed both houses of the legislature, it was so badly distorted that the association prevailed upon the Governor not to sign it.

Every subsequent session of the legislature until 1937, when the present act was passed, found a veterinary bill before it. Though failure attended repeated efforts the California veterinarians were not easily discouraged. Nineteen thirteen saw the first change in the passage of Senate Bill 1307 introduced by Ed. K. Strobbridge (REP.) of Hayward—Chapter 308, Page 572, Statutes and Amendments to the Codes 1913—Approved June 11, 1913. "An Act to insure the better education of practitioners of veterinary medicine - - - - - amended by adding section 13."

This amendment provided that all monies collected by the board should be reported and turned in monthly to the State Treasury and credited to a fund known as the contingent fund of the Board of Examiners in veterinary medicine, from which all expenses incident to the operation of the board were to be paid. Previously all such funds remaining at the end of the fiscal year had reverted to the state school fund and were lost to the board. There had been occasions when receipts did not compensate the board for its work. At best the accrued surplus was negligible. For example in 1908 only \$3.05 remained after expenses were paid and in 1910 the munificent sum of thirty cents augmented the state school fund. This act insured compensation in lean years by carrying over the surplus from year to year.

No further changes found their way into the statute books for 14 years despite the dogged efforts of the Association and others. In 1927 a new law was enacted and the old one repealed. This will be referred to later.

Section four of the 1907 act provided that licenses from other states could be recognized, provided arrangements were made with said states for a mutual recognition of California licenses and in no case were licenses from states whose standards were lower than those of California to be recognized. Further it was necessary that the Governor approve all licenses issued by reciprocal agreement.

The first such license was issued in 1908 and the practice continued until 1912. In this period 19 veterinarians were licensed merely on the basis that they were licensed in certain other states. These included 7 from New

York, 3 from Iowa, 3 from Pennsylvania, 1 from Missouri, 1 from Nebraska, 1 from the District of Columbia, 1 from Massachusetts and 1 from Washington. Two applicants from Illinois had been refused a license on a reciprocal basis and were required to take an examination.

Though the board had initiated some correspondence with some state boards, it had made no specific reciprocal agreements with any of the above mentioned states. Furthermore none of the licenses issued by the California board had been approved by the Governor.

At the December meeting in 1911 it seems to have suddenly dawned upon the board that the practice they had been following was irregular and so was discontinued. One license was granted in April 1912, though the board had decided to discontinue the practice, because this individual had made application and had been assured of a license by the board prior to its decision not to issue any more.

At least the board can not be condemned for its impetuosity. It apparently deliberated four years over the interpretation of the law, before finally deciding it had been in error.

Before leaving the controversial law to rest in the archives of veterinary history it is necessary to recount some of the trials the board suffered. As stated previously the board originally consisted of Archibald, Fox, Creely (E.J.), Rowland and Orme. The initial appointment designated that one was to serve for one year, one for two, one for three and the other two for four years. We have not been told the term of each.

The first new face to appear on the board was that of Otis A. Longley of Fresno, who replaced Creely in 1909. The latter had been under fire from the Southern Auxiliary of the Association so it is not clear that he was the first whose tenure was to expire.

The following year W. E. D. Morrison of Los Angeles replaced Orme. Morrison was to be the last appointment made until 1917.

The Hon. Hiram W. Johnson became Governor in 1911 and during his entire governorship of 7 years he ignored the veterinarian. Though appealed to by the board as well as the association, he refused to act. Even in matters other than board appointments he utterly refused to take any action. Matters requiring his approval, such as reciprocal licenses that had been issued by the board never did get his approval or disapproval.

The actual term of appointment of the members of the board had expired but since there were no new appointees the members remained on it throughout the years. Dr. Rowland attended few meetings after 1910 and Dr. Morrison refused to serve after October 1915.

This left only three members to function viz., Archibald, Fox and Longley. These men remained faithful in spite of their desire to be relieved. During World War I Dr. Longley was in the armed services and since three were required for a quorum the board did not meet and no examinations were held until after his return in 1919.

About this time Dr. Archibald's health began to fail and it became the practice for the board to convene, hold its business session, and then authorize and designate either Dr. Longley or Dr. Fox, or both, to give the examination at a subsequent date. One of these meetings in 1919 was held in Dr. Archibald's residence on account of his inability to leave his home. He never recovered.

Fortunately for the veterinarian in 1917, Johnson resigned as Governor and was succeeded by Wm. D. Stevens. It appeared for a time that Governor Stevens must have inherited his predecessor's policies toward the veterinary profession but finally in 1919 he appointed an entirely new board to replace the old one. This board met October 6th and was comprised of Dr. E. J. Creely; John F. McKenna, W. W. Thomas, John L. Tyler and Maynard Rosenberger.

Seven more years were to pass before a new face was to grace a meeting of the State board of veterinary examiners. In 1926—Drs. W. L. Edwards, John J. Hogarty and G. E. Middehoff replaced Drs. Creely, Thomas and McKenna. This ended the peculiar situation that attended the state board for almost twenty years and appointments have since been on a more or less normal basis.

Many interesting and entertaining anecdotes can be written especially for the period of 1907-1927. The case of an offer of fifty dollars to a former member of the board, for his influence with the existing board, by one who had just taken the examination for a state license is pertinent. The briber, much to his surprise, no doubt, had satisfactorily passed the examination but as yet was not aware of it. When the veterinarian approached, reported the incident to the board, the members thereon became incensed at the effrontery and summarily forthwith revoked the newly issued license. Honesty would have been the best policy. . . . In justice to true historical facts it must be added that after due apologies the license was reissued. This and many others can be written but . . . get thee behind me, Satan!

TOO LATE TO CLASSIFY

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In Memoriam

JOHN EGAN

Dr. John Egan, S.F.V.C. '12 passed away in Napa, Calif., July 27, 1949, at the age of 54.

Dr. Egan, born in San Francisco, was the son of Dr. William F. Egan, pioneer San Franciscan veterinarian, and a brother of Dr. Peter I. Egan of the San Francisco Board of Health.

Dr. John Egan was the youngest graduate to leave S.F.V.C., and after his graduation he assisted his father and then joined the San Francisco Board of Health. He was in the Army in 1917-18 and upon his return from World War I went to a ranch in Napa, where he raised polo ponies.

Even though he had not practiced his profession in years, he maintained his membership in the C.S.V.M.A. and the A.V.M.A. from the time of his graduation until the last few years.

A. S. ALMEIDA

Dr. A. S. Almeida of Dixon, passed away September 30, at the age of 63; the funeral was held October 3 in Dixon. Dr. Almeida was a native of Monterey County and grew up in Salinas. He graduated from the San Francisco Veterinary College in 1909 and joined the California State Veterinary Medical Association in 1928.

WILLIAM L. WILLIAMSON

Dr. William L. Williamson, of 1177 Valencia Street, San Francisco, passed away this September. One of California's oldest veterinarians, Dr. Williamson was in his eighties at the time of his death. Although not a member of the Association, we wish to give this space to Dr. Williamson because he was so well known in the veterinarian world as a reactionary figure.

Dr. Williamson was perhaps the last of the Horse-Street-Car Veterinarians, and retained his position as Claims Veterinarian until 1924.

Dr. Williamson graduated from McKillip Veterinary College in Chicago in 1895 and was licensed in California in 1899. He lived with his wife, until her death, in San Francisco's Whitcomb Hotel for 25 years. California loses one of her famous old characters in the death of William Williamson, D.V.M.

Dr. and Mrs. Charles Ozanian announce the birth of a son, September 27, 1949, in Bellflower, California. Master Charles Edward weighed 8 lbs. 9 oz., has brown eyes, black hair.

OPPORTUNITIES

Positions Wanted

Assistantship wanted. Small animal specialist, will go anywhere, California licensed. Wash. S. '49. Contact C.S.V.M.A.

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Experienced small animal practitioner. Licensed in California, available for assistantship. Operated own hospital for 20 years in Southern California. Refer to Association Office, 3004 16th St., Room 208.

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Hospital man, experienced in small animal and human nursing (not a veterinarian). Married. Position wanted in small animal hospital with one veterinarian only. In Santa Cruz-Monterey area. Would give present employer at least 30 days' notice. Write XCL, THE CALIFORNIA VETERINARIAN.

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Small animal practitioner with 15 years' experience in New York State, desires to locate with Southern California veterinarian. Write your Association Secretary.

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Long established small animal hospital; large lot with a 6-room flat; \$15,000 down, terms. San Francisco Bay Area.

U. C. Man Departs for European Meeting

Dr. Karl Meyer, director of the University of California's Hooper Foundation at the Medical Center, San Francisco, is one of a group of renowned experts called by the World Health Organization to a conference on plague at Geneva, Switzerland.

Dr. Meyer, an internationally recognized leader in plague research, will depart September 15 for the conference, scheduled for September 19 to 24. An extensive scientific program covering all modern aspects of the ancient disease has been planned.

The scientist was recently elected president of the International Northwestern Conference on Diseases of Nature Communicable to Man. This organization recently met on the Berkeley campus of the University. Scientists from all over the nation and Canada met to discuss the latest developments in such diseases as plague, encephalitis, foot and mouth disease, brucellosis, etc.

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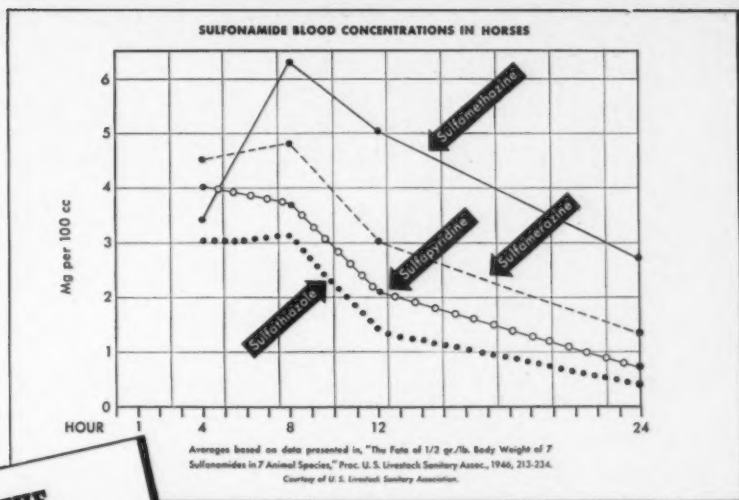
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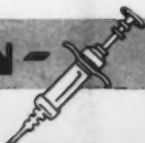
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